# All India Test Series (2023-24)

**Test Code: ANY/09**

## AITS TEST - 09

**YAKEEN NEET**

**DURATION: 200 Minutes** | **DATE: 21/04/2024** | **M. MARKS: 720**

### Topics Covered

| | |
|---|---|
| **Physics:** | Full Syllabus. |
| **Chemistry:** | Full Syllabus. |
| **Botany:** | Full Syllabus. |
| **Zoology:** | Full Syllabus. |

**General Instructions**:

1. Immediately fill in the particulars on this page of the test booklet.
2. The test is of **3 hours 20 minutes** duration and the Test Booklet contains **200** multiple choice questions (four options with a single correct answer) from **Physics, Chemistry and Biology (Botany and Zoology)**. **50** questions in each subject are divided into **two sections (A and B)** as per details given below:
   (a) **Section A** shall consist of **35 (Thirty-five)** Questions in each subject (Question Nos. – 1 to 35, 51 to 85, 101 to 135 and 151 to 185). All Questions are compulsory.
   (b) **Section B** shall consist of **15 (Fifteen)** questions in each subject (Question Nos. – 36 to 50, 86 to 100, 136 to 150 and 186 to 200). In section B, a candidate needs to **attempt any 10 (Ten)** questions out of **15 (Fifteen)** in each subject.
   **Candidates are advised to read all 15 questions in each subject of Section-B** before they start attempting the question paper. In the event of a candidate attempting more than ten questions, **the first ten questions answered by the candidate shall be evaluated.**
3. There is only one correct response for each question.
4. Each **correct** answer will give **4 Mark** while **1 Mark** will be **deducted** for a **wrong** answer. The maximum marks are 720.
5. No student is allowed to carry any textual material, printed or written, bits of papers, pager, mobile phone, any electronic device, etc. inside the examination room/hall.
6. On completion of the test, the candidate must hand over the Answer Sheet to the Invigilator on duty in the Room/Hall. However, the candidates are allowed to take away this Test Booklet with them.

**OMR Instructions:**

1. Use blue/black dark ballpoint pen.
2. Darken the bubbles completely. Don't put a tick mark or a cross mark where it is specified that you fill the bubbles completely. Half-filled or over-filled bubbles will not be read by the software.
3. Never use pencils to mark your answers.
4. Never use whiteners to rectify filling errors as they may disrupt the scanning and evaluation process.
5. Writing on the OMR Sheet is permitted on the specified area only and even small marks other than the specified area may create problems during the evaluation.
6. Multiple markings will be treated as invalid responses.
7. **Do not fold or make any stray mark on the Answer Sheet (OMR).**

**Name of the Student (In CAPITALS): _____**

**Roll Number: _____**

**OMR Bar Code Number: _____**

**Student's Signature: _____ Invigilator's Signature _____**

# (PHYSICS)

## SECTION-A

**1.** The change in internal energy $\Delta U$ of $n$ moles of an ideal gas for $\Delta T$ change in temperature expressed as: $\Delta U = nC_V\Delta T$. This relation is valid for which of the following processes? ($C_V$ is the molar heat capacity of the gas at constant volume)

(1) Isochoric process only
(2) Adiabatic process only
(3) Only isochoric and isothermal processes
(4) Any thermodynamic process

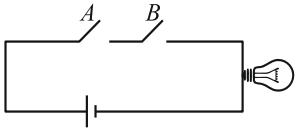
**2.** The ratio of kinetic energy of a molecule of nitrogen gas and argon at 27°C is;

(1) 5 : 3 (2) 5 : 2
(3) 7 : 5 (4) 3 : 7

**3.** The total energy of an electron in an atom in an orbit is –3.4 eV. Its kinetic and potential energies are, respectively:

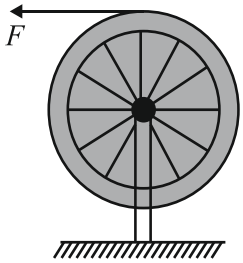
(1) –3.4 eV, –3.4 eV
(2) –3.4 eV, – 6.8 eV
(3) 3.4 eV, – 6.8 eV
(4) 3.4 eV, 3.4 eV

**4.** The **correct** Boolean operation represented by the circuit diagram given below is;



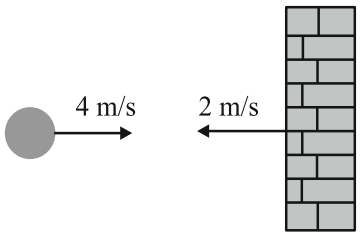

(1) AND
(2) OR
(3) NAND
(4) NOR

**5.** A string is wrapped around the rim of a wheel of moment of inertia 0.40 kgm$^2$ and radius 40 cm. The wheel is free to rotate about its axis. Initially the wheel is at rest. The string is now pulled by a force of 40 N. The angular velocity of the wheel after 4 s is;




(1) 100 rad/s (2) 120 rad/s
(3) 140 rad/s (4) 160 rad/s

**6.** A ball is moving with a velocity of 4 m/s towards a heavy wall moving towards the ball with a speed of 2 m/s as shown in figure. If the collision between the ball and the wall is elastic, then the speed velocity of ball immediately after the collision is;




(1) 2 m/s
(2) 4 m/s
(3) 6 m/s
(4) 8 m/s

**7.** A person moves due east at a speed 6 m/s and feels the wind is blowing towards south at a speed 6 m/s. The actual velocity of wind blow is;

(1) 6 m/s along north west east
(2) $6\sqrt{2}$ m/s along north east
(3) $6\sqrt{2}$ m/s along south east
(4) 6 m/s along south east

**8.** In case of circular motion with increasing speed, if θ is the angle made by the velocity vector and the net acceleration vector, then choose the **correct** option.

(1) θ is always acute
(2) θ is always obtuse
(3) θ is always 0°
(4) θ is always 90°

**9.** A particle executes S.H.M. and starts from its mean position. The particle covers a distance equal to $\frac{\sqrt{3}}{2}$ times of its amplitude in 1 s. The time period of motion is;

(1) 2 s (2) 4 s
(3) 6 s (4) 10 s

**10.** A coil consists of 250 turns of wire with a total resistance of 2.0 Ω. Each turn is a square of side 20 cm, and a uniform magnetic field directed perpendicular to the plane of the coil is turned on. If the field changes linearly from 0 to 0.5 T in 2 s, then the magnitude of induced current in the coil while the field is changing is;

(1) 1.0 A (2) 1.25 A
(3) 1.75 A (4) 2.0 A

**11.** Identify the **correct** relation (between amplitude $A$ and wave number $k$) under which the maximum particle velocity is equal to three times that of the wave velocity corresponding to the equation: $y = A\sin(\omega t - kx)$.

(1) $A = \frac{\sqrt{3}}{k}$ (2) $A = \frac{\sqrt{6}}{k}$

(3) $A = \frac{3}{k}$ (4) $A = \frac{6}{k}$

**12.** How much work will be done in increasing the diameter of a soap bubble from 2 cm to 4 cm? (Surface tension of soap solution is $3.0 \times 10^{-2}$ N /m)

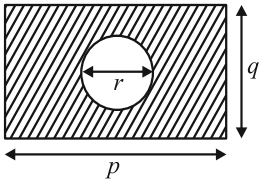
(1) $12\pi \times 10^{-6}$ J

(2) $48\pi \times 10^{-6}$ J

(3) $72\pi \times 10^{-6}$ J

(4) $86\pi \times 10^{-6}$ J

**13.** A rectangular plate has a circular cavity as shown in the figure. If we increase the temperature of the entire plate, then which dimension will increase in following figure?




(1) $p$ and $q$ only

(2) $p$ and $r$ only

(3) $q$ and $r$ only

(4) $p$, $q$ and $r$

**14.** A body of mass 10 kg is attached to a 60 cm long wire whose breaking stress is $9.6 \times 10^7$ N/m$^2$. The area of cross section of the wire is $10^{-6}$ m$^2$. What is the maximum angular velocity with which it can be rotated in a horizontal circle?

(1) 2 rad/s (2) 4 rad/s

(3) 5 rad/s (4) 6 rad/s

**15.** The thermal conductivity of brick is 1.5 Wm$^{-1}$K$^{-1}$, and that of cement is 3.0 Wm$^{-1}$K$^{-1}$. Assuming the area to be the same, what thickness of cement will have the same insulation as the brick with a thickness of 15 cm?

(1) 7.5 m (2) 15 cm

(3) 30 cm (4) 45 cm

**16.** The moment of inertia of a sphere about its diametric axis is 30 kgm$^2$. The moment of inertia of the same sphere about any tangent is;

(1) 30 kgm$^2$ (2) 60 kgm$^2$

(3) 95 kgm$^2$ (4) 105 kgm$^2$

**17.** The initial and final temperatures of water as recorded by an observer are (42.4 ± 0.3)°C and (75.3 ± 0.2)°C respectively. The rise in temperature with proper error limits is;

(1) (32.0 ± 0.2)°C (2) (33.0 ± 0.5)°C

(3) (32.9 ± 0.1)°C (4) (32.9 ± 0.5)°C

**18.** Assuming Earth to be a sphere of uniform mass density, how much would a body weigh at a depth $\frac{R}{3}$ from the centre of the Earth ($R$ is the radius of the Earth), if it weighs 60 N on the surface?

(1) 60 N (2) 40 N

(3) 30 N (4) 20 N

**19.** **Assertion (A):** Magnetic field is produced only by moving charge, electric conduction current and a magnet.

**Reason (R):** Source of electromagnetic wave is moving charge.

(1) Both **Assertion (A)** and **Reason (R)** are true and **Reason (R)** is a correct explanation of **Assertion (A)**.

(2) Both **Assertion (A)** and **Reason (R)** are true but **Reason (R)** is not a correct explanation of **Assertion (A)**.

(3) **Assertion (A)** is true and **Reason (R)** is false.

(4) Both **Assertion (A)** and **Reason (R)** are false.

**20.** The separation between the plates of a charged parallel- plate capacitor is increased. The force between the plates;

(1) increases

(2) decreases

(3) remains the same

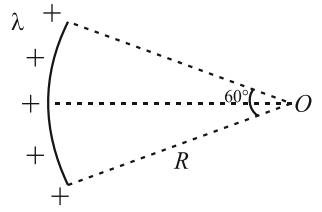
(4) first increases then decreases

**21.** A particle starts oscillating simple harmonically from its equilibrium position with time period $T$. The ratio of K.E. and P.E. of the particle at time $t = \frac{T}{6}$ s is;

(1) 3 : 1 (2) 1 : 3

(3) 1 : 4 (4) 4 : 1

**22.** An arc subtending an angle of 60° at a point $O$ has a linear charge density of 1.8 nC/m and radius as 2 m. What is the magnitude of electric field due to the arc at point $O$?




(1) 1.8 N/C (2) 6.8 N/C

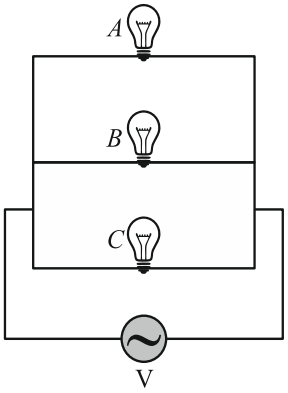
(3) 8.1 N/C (4) 12.9 N/C

**23.** A circuit consisting of an inductor and a resistor is joined to a 100 V AC supply. The current drawn by the circuit is 20 A. If the power used in the circuit is 1000 W, then the wattless current is;

(1) $20\sqrt{3}$ A (2) 20 A

(3) 10 A (4) $10\sqrt{3}$ A

**24.** Three bulbs *A*, *B* and *C* of power ratings 150 W, 220 V; 170 W, 220 V and 120 W, 220 V respectively are connected as shown. If all the bulbs are operating at 220 V, then which of the following is the **correct** order for brightness of the bulbs *A*, *B* and *C*?



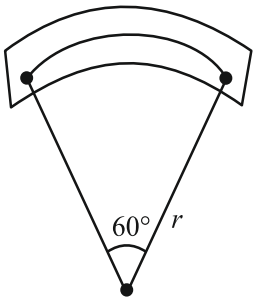

(1) Brightness of bulb *A* > Brightness of bulb *B* > Brightness of bulb *C*

(2) Brightness of bulb *B* > Brightness of bulb *A* > Brightness of bulb *C*

(3) Brightness of bulb *C* > Brightness of bulb *B* > Brightness of bulb *A*

(4) Brightness of bulb *B* > Brightness of bulb *C* > Brightness of bulb *A*

**25.** A bar magnet of length *l* and magnetic moment *M* is bent in the form of a circular arc of radius *r* as shown in the figure. The new magnetic dipole moment will be;




(1) $\frac{2M}{\pi}$ (2) $\frac{2M}{3\pi}$

(3) $\frac{3M}{\pi}$ (4) $\frac{3M}{2\pi}$

**26.** A body of mass 12 kg is at rest. If a force of 6 N is applied on it, then the work done in the first second is;

(1) 0.5 J (2) 1.5 J

(3) 1.9 J (4) 2.0 J

**27.** A convex lens with a refractive index of 1.5 is first placed in air and then placed in a liquid of refractive index 1.2. What will be the nature of the lens in the liquid and in air respectively?

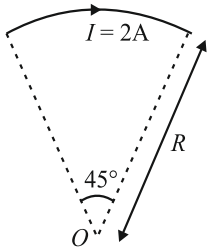
(1) Convergent and divergent

(2) Divergent and convergent

(3) Convergent in both the cases

(4) Divergent in both the cases

**28.** The magnetic field at the centre of current carrying circular arc of radius 2 m as shown in figure is;




(1) $\frac{\pi}{4}\times10^{-7}$ T (2) $\pi\times10^{-7}$ T

(3) $\frac{\pi}{2}\times10^{-7}$ T (4) $\frac{\pi}{8}\times10^{-7}$ T

**29.** A particle moves in a circle of radius 0.2 m at a speed that uniformly increases. What is the angular acceleration of particle if its speed changes from 4.0 m/s to 6.0 m/s in 4.0 s?

(1) 0.5 rad/s$^2$

(2) 1.0 rad/s$^2$

(3) 1.5 rad/s$^2$

(4) 2.5 rad/s$^2$

**30.** A ray of white light is incident on a concave mirror of focal length *f*. If the entire setup is immersed in a liquid of refractive index $\mu$, then identify the **correct** relation between $f_R$ and $f_V$ (where $f_R$ is the focal length of the mirror for red light and $f_V$ is the focal length for violet light).

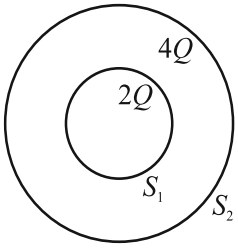
(1) $f_R < f_V$

(2) $f_R > f_V$

(3) $f_R = f_V$

(4) Either 1 or 2 depending on $\mu$

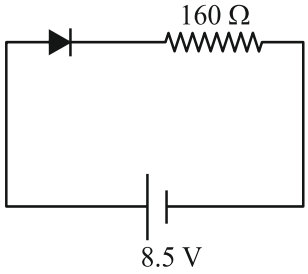
**31.** $S_1$ and $S_2$ are two concentric shells enclosing charges $2Q$ and $4Q$ respectively as shown in figure. What is the ratio of the electric flux through $S_1$ and $S_2$?




(1) 1 : 2 (2) 2 : 1

(3) 1 : 3 (4) 3 : 1

**32.** The figure shows a diode connected to an external resistance and a cell. If the barrier potential developed in diode is 0.5 V, then the value of current in the circuit in milliampere is;




(1) 0 (2) 30
(3) 40 (4) 50

**33.** If the critical angle for a certain medium and vacuum is 45°, then the velocity of light in the medium is;

(1) $\sqrt{2}\times10^8$ m/s
(2) $1.5\sqrt{2}\times10^8$ m/s
(3) $3\sqrt{2}\times10^8$ m/s
(4) $0.5\sqrt{2}\times10^8$ m/s

**34.** A sample of gas with a volume of 600 cc at a pressure of 3 atm is compressed to a volume of 400 cc. What is the final pressure if the temperature is kept constant?

(1) 2 atm
(2) 2.5 atm
(3) 3 atm
(4) 4.5 atm

**35.** In a plane electromagnetic wave travelling in vacuum, the electric field oscillates sinusoidally at a frequency of $2.5 \times 10^{10}$ Hz and an amplitude of 57 V/m. What is the amplitude of the oscillating magnetic field?

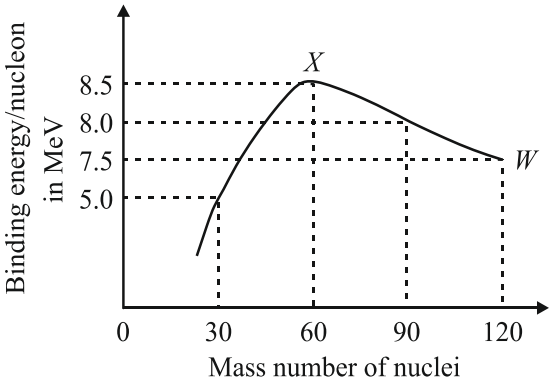
(1) $1.9 \times 10^{-6}$ T
(2) $1.9 \times 10^{-7}$ T
(3) $2.9 \times 10^{-7}$ T
(4) $2.9 \times 10^{-6}$ T

## SECTION-B

**36.** Two coaxial solenoids are made by winding thin Cu wire over a pipe of cross-sectional area 20 $cm^2$ and length 40 cm. If one of the solenoids has 300 turns and the other 400 turns, their mutual inductance is;

(1) $2.4\pi \times 10^{-5}$ H
(2) $4.8\pi \times 10^{-4}$ H
(3) $4.8\pi \times 10^{-5}$ H
(4) $2.4\pi \times 10^{-4}$ H

**37.** Binding energy per nucleon versus mass number curve for two nuclei $W$ and $X$ is shown in figure. Identify the **correct** option for the process: $W \rightarrow 2X$.

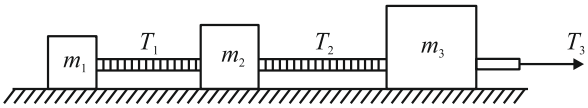



(1) 100 MeV of energy is released
(2) 100 MeV of energy is absorbed
(3) 120 MeV of energy is released
(4) 120 MeV of energy is absorbed

**38.** A particle of mass $M$ at rest decays into two particles of masses $m_1$ and $m_2$ having non-zero velocities. The ratio of the de-Broglie wavelengths of the particles $\lambda_1 : \lambda_2$ is;

(1) $\frac{m_1}{m_2}$ (2) $\frac{m_2}{m_1}$
(3) 1 (4) $\frac{\sqrt{m_1}}{\sqrt{m_2}}$

**39.** Three blocks are connected by strings as shown in the figure and are pulled by a force $T_3$ = 150 N. If $m_1$ = 2 kg, $m_2$ = 10 kg and $m_3$ = 18 kg, the ratio of tensions $T_1$ and $T_2$ is;




(1) 1 : 3 (2) 3 : 1
(3) 1 : 6 (4) 6 : 1

**40.** The cylindrical tube of a spray pump has a cross-section area of 4 $cm^2$, one end of which has 50 fine holes each of area $10^{-8}$ $m^2$. If the liquid flows inside the tube with a speed of 0.15 m/min, then the speed with which the liquid is ejected through the holes is;

(1) 0.5 m/s
(2) 1 m/s
(3) 1.5 m/s
(4) 2 m/s

**41.** The electric force on a charge $q_1$ due to $q_2$ is $(6\hat{i}-2\hat{j})$ N. What is the force on $q_2$ due to $q_1$?

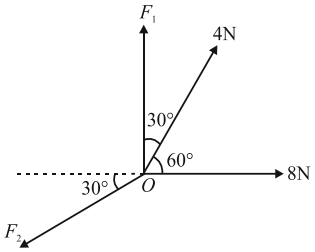
(1) $(6\hat{i}-2\hat{j})$ N (2) $(6\hat{i}-6\hat{j})$ N
(3) $(-6\hat{i}+2\hat{j})$ N (4) $(-2\hat{i}+6\hat{j})$ N

**42.** A charge $q$ is uniformly distributed on a non-conducting disc of radius $R$. It is rotated with an angular speed ω about an axis passing through the centre of mass of the disc and perpendicular to its plane. The magnetic moment of the disc is;

(1) $\frac{qR\omega}{2}$ (2) $\frac{qR^2\omega^2}{2}$

(3) $\frac{qR^2\omega}{4}$ (4) $\frac{qR^2\omega}{2}$

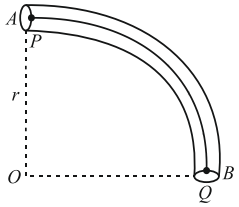
**43.** An object is in equilibrium acted upon by four concurrent forces in the directions shown in figure. The ratio of magnitudes of forces $F_1$ and $F_2$ is;




(1) 1 : 2 (2) 2 : 1

(3) 1 : 5 (4) 5 : 1

**44.** A smooth narrow tube in the form of an arc $AB$ of a circle of centre $O$ and radius $r$ is fixed so that $A$ is vertically above $O$ and $OB$ is horizontal as shown in figure. Particles $P$ of mass $m$ and $Q$ of mass $2m$, with a light inextensible string of length $\left(\frac{\pi r}{2}\right)$ connecting them, are placed inside the tube with $P$ at $A$ and $Q$ at $B$ and released from rest. Assuming the string remains taut during motion, what is the speed of particles when $P$ reaches $B$?




(1) $\sqrt{\frac{2}{3}(1+\pi)gr}$ (2) $\sqrt{\frac{2}{3}(1-\pi)gr}$

(3) $\sqrt{\frac{1}{2}(1+\pi)gr}$ (4) $\sqrt{\frac{1}{2}(1-\pi)gr}$

**45.** The path difference between two interfering waves at a point on screen is 171.5 times the wavelength. If the path difference is 0.01029 cm, then nature of the fringe and the wavelength of light used are respectively;

(1) Dark fringe and 5000 Å

(2) Bright fringe and 5000 Å

(3) Bright fringe and 6000 Å

(4) Dark fringe and 6000 Å

**46.** Consider the following situation and identify the **correct** option.

Kinetic energy of a particle on the surface of earth is $E_0$ and the potential energy is $-2E_0$.

**Statement I:** The particle will escape to infinity.

**Statement II:** The value of potential energy where speed of the particle becomes zero is $-E_0$.

(1) Both statement I and II are correct.

(2) Both statement I and II are incorrect.

(3) Statement I is correct but statement II is incorrect.

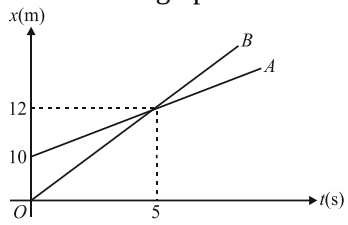
(4) Statement I is incorrect but statement II is correct.

**47.** Two wires are made of the same material. The length and diameter of the first wire are both one third of those of the second wire. If equal loads are applied on both the wires, then the ratio of increase in their lengths is;

(1) 3 : 1 (2) 9 : 1

(3) 27 : 1 (4) 81 : 1

**48.** Two particles are moving along $x$-axis. Their position versus time graph is as shown below.




What is the magnitude of the velocity of $A$ with respect to $B$?

(1) –2.4 m/s (2) –2 m/s

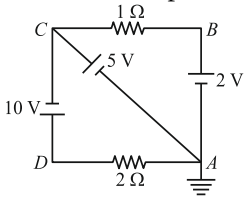
(3) 2 m/s (4) 2.5 m/s

**49.** Two particles, one of mass 2 kg and the other of 4 kg are projected simultaneously with the same speed from the roof of a tower, the one of mass 2 kg vertically upwards and the other vertically downwards. What is the acceleration of centre of mass of these two particles? ($g$ is the acceleration due to gravity)

(1) $g$ (2) $\frac{g}{3}$

(3) $\frac{g}{4}$ (4) zero

**50.** In the circuit shown in figure, the current through 1 Ω and 2 Ω resistor is respectively;




(1) 3 A from B to C and 7.5 A from A to D

(2) 3 A from C to B and 7.5 A from D to A

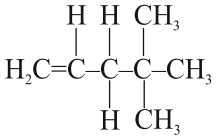
(3) 7.5 A from C to B and 3 A from D to A

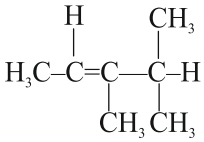
(4) 7.5 A from B to A and 3 A from D to C

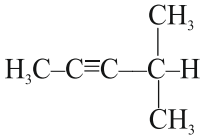
# (CHEMISTRY)

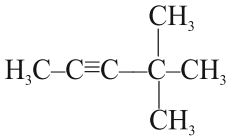
## SECTION-A

**51.** Which of the following is a **correct** structure of 4,4-Dimethylpent-2-yne?

(1) 

(2) 

(3) 

(4) 

**52.** Arrange the following compounds in decreasing order of reactivity towards nucleophilic addition;

(I) HCHO (II) $CH_3CHO$

(III) $C_6H_5COC_6H_5$ (IV) $C_6H_5CHO$

(V) $CH_3COCH_3$

(1) II > I > IV > III > V

(2) I > II > IV > V > III

(3) I > II > IV > III > V

(4) I > II > III > IV > V

**53.** Match **List I** with **List II** and choose the **correct** option.

| List I (Species) | | List II (Type of bonds) | |
|---|---|---|---|
| (A) | $(SiH_3)_3N$ | (I) | 3-centre-2-electron bond |
| (B) | $BF_3$ | (II) | $sp^3$-hybridisation |
| (C) | $SiO_2$ | (III) | pπ- pπ bond |
| (D) | $B_2H_6$ | (IV) | pπ- dπ bond |

(1) A-IV, B-III, C-I, D-II

(2) A-III, B-II, C-IV, D-I

(3) A-II, B-I, C-III, D-IV

(4) A-IV, B-III, C-II, D-I

**54.** Which of the following compound **cannot** give a test for nitrogen by Lassaigne's extract?

(1) Aniline

(2) Hydroxylamine

(3) Glycine

(4) Urea

**55.** Find the total number of alcohol group present in glucose which reacts with acetic anhydride for acetylation;

(1) 3 (2) 4

(3) 5 (4) 2

**56.** $MgCO_3(s) \rightleftharpoons MgO(s) + CO_2(g)$

Which of the following relation is **correct**, for the given reaction?

(1) $K_p < K_C$ (2) $K_C < K_p$

(3) $K_p = K_C$ (4) None of these

**57.** Match **List I** with **List II** and choose the **correct** option.

| List I (Species) | | List II (Oxidation state of central atom) | |
|---|---|---|---|
| (A) | $IF_5$ | (I) | +6 |
| (B) | $CO_2$ | (II) | –2 |
| (C) | $S^{2-}$ | (III) | +4 |
| (D) | $H_2S_2O_8$ | (IV) | +5 |

(1) A-IV, B-III, C-II, D-I

(2) A-III, B-II, C-IV, D-I

(3) A-II, B-I, C-III, D-IV

(4) A-II, B-III, C-IV, D-I

**58.** Find the $\Delta G^0$ for the given reaction;

$Cu^{2+} + Fe \rightarrow Fe^{2+} + Cu$

$\left[ E^0_{Cu^{2+}/Cu} = 0.30\ V, E^0_{Fe^{2+}/Fe} = 0.40\ V \right]$

(1) 19.0 kJ (2) 19.3 kJ

(3) 18.5 kJ (4) 16.5 kJ

**59.** Which of the following series of compounds have same mass percent of carbon?

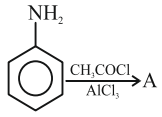
(1) $CO_2$, CO

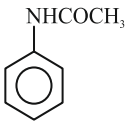
(2) $CH_4$, $C_6H_6$, $C_2H_2$

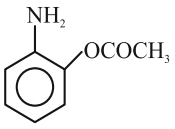
(3) $C_2H_2$, $C_6H_6$, $C_{10}H_8$

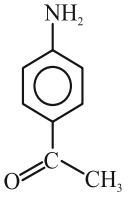
(4) HCHO, $CH_3COOH$, $C_6H_{12}O_6$

**60.** What is the major product (A) in the following reaction?



(1) 

(2) 

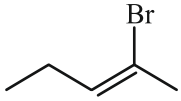
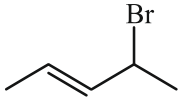
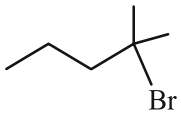
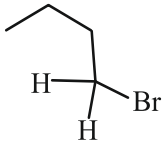
(3) 

(4) None of these

**61.** **Assertion (A):** Acid catalysed inversion of cane sugar is an example of pseudo first order reaction.
**Reason (R):** For a first order reaction, $t_{0.75} = 2t_{0.50}$

(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A).**
(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A).**
(3) **Assertion (A)** is true, but **Reason (R)** is false.
(4) **Assertion (A)** is false, but **Reason (R)** is true.

**62.** Which of the following compound undergoes fastest $S_N2$ reaction?

(1) 
(2) 
(3) 
(4) 

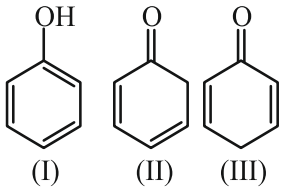
**63.** For the unpaired electron of chlorine, the value of four quantum numbers are;

| | n | $l$ | m | s |
|---|---|---|---|---|
| (1) | 3 | 2 | 0 | $+\frac{1}{2}$ |
| (2) | 3 | 1 | +1 | $+\frac{1}{2}$ |
| (3) | 3 | 1 | +1 | 0 |
| (4) | 3 | 0 | –1 | $+\frac{1}{2}$ |

**64.** **Statement I:** $N^{3-}$ has bigger size as compared to its parent atom.
**Statement II:** $Al^{3+}$ has smaller size as compared to its parent atom.

(1) Statement I and Statement II both are correct.
(2) Statement I and Statement II both are incorrect.
(3) Statement I is correct, but Statement II is incorrect.
(4) Statement I is incorrect, but Statement II is correct.

**65.** The tautomer of (I) is;


(I) (II) (III)

(1) Only II (2) Only III
(3) Both II and III (4) None of these

**66.** Which of the following compound show optical activity?

(1) Neopentane (2) 2-Methylhexane
(3) 3-Methylhexane (4) Isopentane

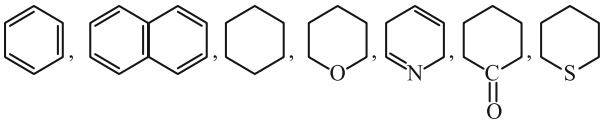
**67.** **Assertion (A):** When aniline reacts with $CHCl_3$/KOH in the presence of heat, phenyl isocyanide form.
**Reason (R):** In the above reaction, the intermediate is carbene.

(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A).**
(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A).**
(3) **Assertion (A)** is true, but **Reason (R)** is false.
(4) **Assertion (A)** is false, but **Reason (R)** is true.

**68.** For the reaction:
$NH_4COONH_2(s) \rightleftharpoons 2NH_3(g) + CO_2(g)$,
The expression of $K_p$ is;

(1) $P^2_{NH_3}$ (2) $P^2_{NH_3} \cdot P_{CO_2}$
(3) $\frac{P^2_{NH_3} \cdot P_{CO_2}}{P_{NH_4COONH_2}}$ (4) $\frac{P_{CO_2}}{P_{NH_4COONH_2}}$

**69.** Find the ratio of the total number of homocyclic and total number of heterocyclic compounds which are given below.



(1) $\frac{3}{4}$ (2) $\frac{5}{2}$
(3) $\frac{3}{2}$ (4) $\frac{4}{3}$

**70.** In a chemical reaction, the value of enthalpy change and entropy change $(-2 \times 10^{-3})$ cal and 7 cal/K respectively. What is the nature of reaction at 25°C?

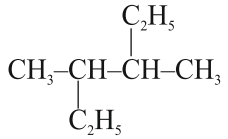
(1) Spontaneous
(2) Non-spontaneous
(3) Reversible
(4) Irreversible

**71.** What is the solvent in the amalgam of mercury with sodium?

(1) Amalgam
(2) Mercury
(3) Sodium
(4) None of these

**72.** **Assertion (A):** The IUPAC name of neopentane is 2-Methylbutane.

**Reason (R):** The IUPAC name of the given compound is 3,4-Dimethylhexane.



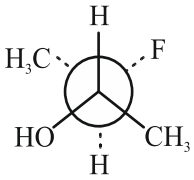
(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A).**

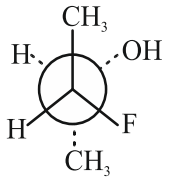
(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A).**

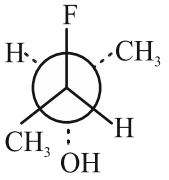
(3) **Assertion (A)** is true, but **Reason (R)** is false.

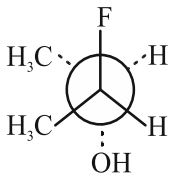
(4) **Assertion (A)** is false, but **Reason (R)** is true.

**73.** Which of the following conformation is **most** stable?

(1) 

(2) 

(3) 

(4) 

**74.** **Assertion (A):** On oxidation, secondary alcohol can be converted into aldehyde.

**Reason (R):** For the oxidation of 1° or 2° alcohol there **must** be C–H bond present on the same carbon where alcohol located.

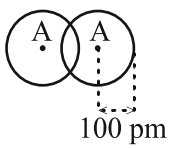
(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A).**

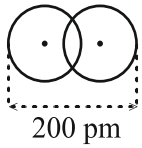
(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A).**

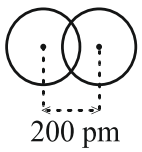
(3) **Assertion (A)** is true, but **Reason (R)** is false.

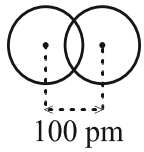
(4) **Assertion (A)** is false, but **Reason (R)** is true.

**75.** Covalent radius of an element (A) is 100 pm. What is the best representation of $A_2$ molecule?

(1) 


(2) 


(3) 


(4) 


**76.** Assume that $10^{-17}$J of light energy is needed by the interior of the human eye to see an object. How many photons of green light ($\lambda$ = 495 nm) are needed to generate this minimum energy;

(1) 25

(2) 20

(3) 23

(4) 19

**77.** **Statement I:** The law of conservation of mass is valid for nuclear reaction.

**Statement II:** As per law of conservation of mass in chemical reaction, the total mass of reactants and products remain same.

(1) Statement I and Statement II both are correct.

(2) Statement I and Statement II both are incorrect.

(3) Statement I is correct, but Statement II is incorrect.

(4) Statement I is incorrect, but Statement II is correct.

**78.** The common ion effect is shown by which of the following sets of solutions;

(1) $BaCl_2 + Ba(NO_3)_2$

(2) NaCl + HCl

(3) $NH_4OH + NH_4Cl$

(4) None of these

**79.** Which of the following transition metal have lowest first ionisation enthalpy?

(1) Cr

(2) Cu

(3) Co

(4) Fe

**80.** The reducing character of hydrides of group 14 elements is;

(1) Maximum for $CH_4$ and minimum for $PbH_4$

(2) Maximum for $CH_4$ and minimum for $SnH_4$

(3) Maximum for $PbH_4$ and minimum for $SiH_4$

(4) Maximum for $PbH_4$ and minimum for $CH_4$

**81.** What is the change in internal energy when gas contracts from 377 mL to 177 mL under a constant pressure of 1520 torr, while at the same time being cooled by removing 124 J heat?

(1) 40.52 J

(2) –83.48 J

(3) –248 J

(4) None of these

**82.** When $Me_2SiCl_2$ reacts with water (hydrolysis), the product forms;

(1) $Me_2SiClOH$

(2) $Me_2Si = O$

(3) $Me_2Si(OH)_2$

(4) $[–O–Me_2Si–O–]_n$

**83.** The total number of bond pairs and lone pairs present in $BrF_2^+$ is;

(1) 2 (2) 5

(3) 4 (4) 3

**84.** Which of the following statement is **incorrect**?

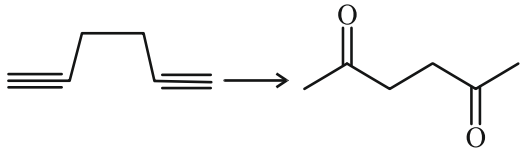
(1) In $K_3[Fe(CN)_6]$, the ligand has satisfied only the secondary valency of ferric ion .

(2) In $K_3[Fe(CN)_6]$, the ligand satisfied both primary and secondary valancies of ferric ion.

(3) In $K_4[Fe(CN)_6]$, the ligand satisfied both primary and secondary ferrous ion.

(4) All of these

**85.** Which of the following reagent is suitable for following conversion?



(1) $OsO_4$, $NaHSO_3$ (2) $H_2SO_4$, water

(3) $HgSO_4$ (4) $HgSO_4/H_2SO_4$

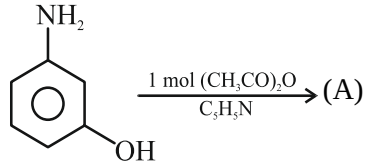
## SECTION-B

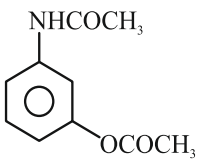
**86.** A current of 2.6 ampere passed through $CuSO_4$ solution for 6 minutes 20 second. The amount of Cu deposited is;

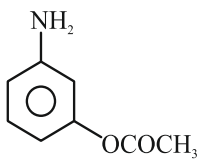
(1) 0.325 gm (2) 3.25 gm

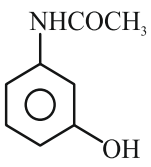
(3) 32.5 gm (4) 0.0325 gm

**87.** What is the major product (A) in the following reaction?




(1) 


(2) 


(3) 


(4) None of these

**88.** Which of the following molecule contain one $p\pi - p\pi$ and two $p\pi - d\pi$ bonds?

(1) $SO_2$

(2) $CO_2$

(3) $SO_3$

(4) $N_2$

**89.** **Assertion (A):** The decomposition of $KClO_3$ to KCl and $O_2$ on heating, is an example of intramolecular redox change.

**Reason (R):** In the above reaction, oxidation and reduction occurring in one compound.

(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A).**

(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A).**

(3) **Assertion (A)** is true, but **Reason (R)** is false.

(4) **Assertion (A)** is false, but **Reason (R)** is true.

**90.** A graph is plotted between log $t_{50\%}$ vs log concentration is a straight line. What conclusion can you draw from the given graph;

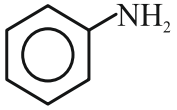
(1) $n = 1, t_{50\%} = \frac{1}{k.a}$

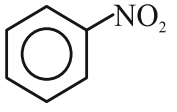
(2) $n = 2, t_{50\%} = \frac{1}{a}$

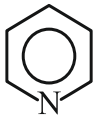
(3) $n = 1, t_{50\%} = \frac{0.693}{k}$

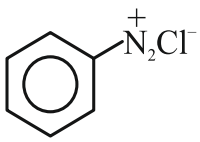
(4) $n = 2, t_{50\%} = \frac{0.693}{k}$

**91.** Which of the following compound will be suitable for Kjeldahl's method for nitrogen estimation?

(1) 


(2) 


(3) 


(4) 


**92.** Which of the following compound has square planar geometry?

(1) $XeO_4$ (2) $XeF_4$

(3) $XeO_2F_2$ (4) $XeO_3F_2$

**93.** Scurvy is a disease caused by;

(1) Virus

(2) Deficiency of vitamin (E)

(3) Deficiency of vitamin (D)

(4) Deficiency of ascorbic acid

**94.** In the given compounds, what is the oxidation state of central metal ion respectively;

$[Fe(H_2O)_5NO]^{2+}$ and $[Fe(CN)_5NO]^{2-}$

(1) +1 and +2

(2) +1 and +1

(3) +2 and +2

(4) +2 and +1

**95.** Which of the following is a colligative property?

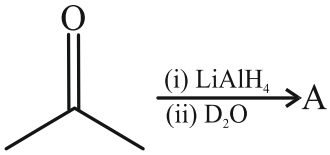
(1) Boiling point

(2) Vapour pressure

(3) Osmotic pressure

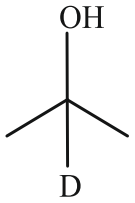
(4) None of these

**96.**

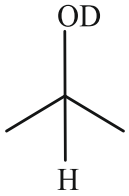



The major product (A) in the following reaction is;

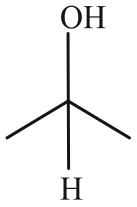
(1)



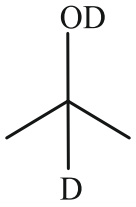

(2)




(3)




(4)




**97.** **Statement I:** Zn, Cd and Hg do not show the properties of d-block elements.

**Statement II:** $Zn^{2+}$ is diamagnetic in nature.

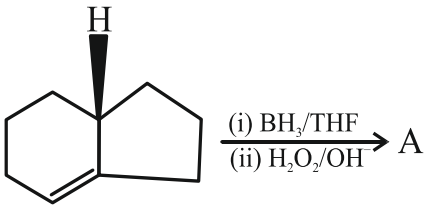
(1) Statement I and Statement II both are correct.

(2) Statement I and Statement II both are incorrect.

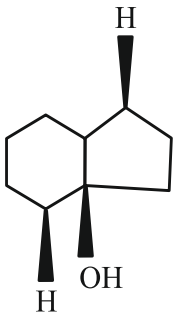
(3) Statement I is correct, but Statement II is incorrect.

(4) Statement I is incorrect, but Statement II is correct.

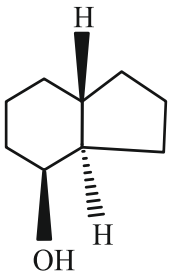
**98.** What is the major product (A) in the given reaction?



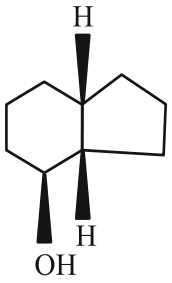

(1)



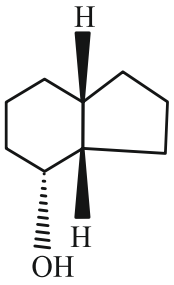

(2)




(3)




(4)




**99.** Which of the following is extensive property?

(1) Pressure

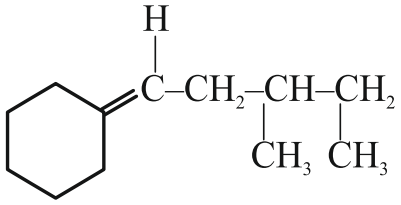
(2) Density

(3) Volume

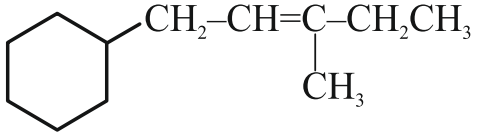
(4) Temperature

**100.** The structure of 1-Cyclohexyl-3-methylpent-1-ene is;

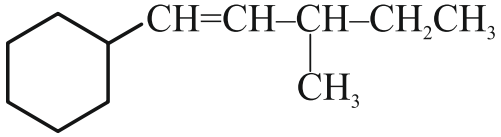
(1)



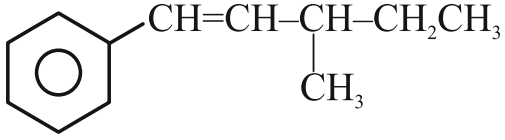

(2)




(3)




(4)



# (BOTANY)

## SECTION-A

**101.** _____ is the process by which anything is grouped into convenient categories based on some easily observable characters.
(1) Classification (2) Identification
(3) Characterisation (4) Nomenclature

**102.** R. H. Whittaker used all the following criteria for classification of organisms, **except**;
(1) cell structure.
(2) mode of nutrition.
(3) presence of cell membrane.
(4) phylogenetic relationships.

**103.** Identify the **correct** statement w.r.t reproduction in algae.
(1) Fusion of two gametes dissimilar in size is observed in case of *Spirogyra*.
(2) Fusion of flagellated gametes similar in size takes place in *Eudorina*.
(3) Fusion between one large, nonmotile (static) female gamete and a smaller, motile male gamete is termed anisogamy.
(4) Fusion of non-flagellated gametes similar in size is called isogamy.

**104.** Read the following statements and choose the **correct** option.
A. In symmetry, the flower may be actinomorphic (bilateral symmetry) or zygomorphic (radial symmetry).
B. *Cassia* shows zygomorphic symmetry.
C. A flower is asymmetric (irregular) if it cannot be divided into two similar halves by any vertical plane passing through the centre.
D. Mustard shows actinomorphic symmetry.
(1) A and B are incorrect
(2) B, C and D are correct
(3) A and C are correct
(4) A, B and D are incorrect

**105.** Identify the **incorrectly** matched pair.
(1) Open vascular system – Dicot roots and stem
(2) Endarch protoxylem – Dicot stem
(3) Conjoint protoxylem – Stem
(4) Radial vascular bundle – Leaves

**106.** **Assertion (A):** Mitochondria, chloroplast and peroxisomes are not considered as part of the endomembrane system.
**Reason (R):** The functions of the mitochondria, chloroplast and peroxisomes are not coordinated with endoplasmic reticulum (ER), golgi complex, lysosomes and vacuoles.
(1) Both **Assertion (A)** and **Reason (R)** are true and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are true but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true and **Reason (R)** is false.
(4) **Assertion (A)** is false and **Reason (R)** is true.

**107.** Read the following statements and identify the **correct** phase of mitosis.
A. Centromeres split and chromatids separate.
B. Chromatids move to opposite poles.
C. The centromere of each chromosome remains directed towards the pole and the arms of the chromosome trailing behind.
(1) Prophase
(2) Metaphase
(3) Anaphase
(4) Telophase

**108.** Identify the **incorrect** statement w.r.t early experiments related to photosynthesis.
(1) Priestley observed that a candle burning in a closed space - a bell jar, soon gets extinguished.
(2) *Cladophora* was placed in a suspension of aerobic bacteria to detect the sites of $CO_2$ evolution.
(3) In green plants $H_2O$ is the hydrogen donor and is oxidised to $O_2$.
(4) Cornelius van Niel based on his studies of purple and green bacteria, demonstrated that photosynthesis is essentially a light-dependent reaction in which hydrogen from a suitable oxidisable compound reduces carbon dioxide to carbohydrates.

**109.** Match **List-I** with **List-II** to find out the **correct** option w.r.t ETS in mitochondrial membrane.

| **List-I** | | **List-II** | |
|---|---|---|---|
| (I) | NADH $\rightarrow$ FMN | (A) | Complex V |
| (II) | Cyt $b \rightarrow$ Fe-S $\rightarrow$ Cyt $c_1$ | (B) | NADH dehydrogenase |
| (III) | Cyt $a \rightarrow$ Cyt $a_3$ | (C) | Complex III |
| (IV) | ATP synthase | (D) | Cytochrome c oxidase |

| | **I** | **II** | **III** | **IV** |
|---|---|---|---|---|
| (1) | B | D | C | A |
| (2) | B | C | D | A |
| (3) | B | A | C | D |
| (4) | B | D | A | C |

**110.** Match **List-I** with **List-II** to find out the **correct** option w.r.t plant growth regulators.

| List-I | | List-II | |
|---|---|---|---|
| (I) | Dormin | (A) | Volatile substance |
| (II) | Kinetin | (B) | General plant growth inhibitor |
| (III) | Ethylene | (C) | Cytokinesis promoting active substance |
| (IV) | Gibberellic acid | (D) | Causes 'bakanae' disease of rice seedlings |

| | I | II | III | IV |
|---|---|---|---|---|
| (1) | C | A | D | B |
| (2) | B | D | C | A |
| (3) | B | C | A | D |
| (4) | C | B | D | A |

**111.** Pollen-pistil interaction involves all the following events, **except**;
(1) landing of pollen grains.
(2) pollen tube formation.
(3) pollen inhibition.
(4) fertilisation.

**112.** **Statement I:** Mendel crossed the tall plant from $F_2$ with a dwarf plant to determine the genotype of the short plants.
**Statement II:** In a typical test cross, an organism showing a dominant phenotype (and whose genotype is to be determined) is crossed with the recessive parent instead of self-crossing.
(1) Statement I and Statement II both are correct.
(2) Statement I is correct but Statement II is incorrect.
(3) Statement I is incorrect but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

**113.** Identify the nitrogenous base which is **not** required for the synthesis of DNA.
(1) Cytosine
(2) Uracil
(3) Thymine
(4) Adenine

**114.** Streptokinase is a bioactive molecule produced by;
(1) *Trichoderma*.
(2) *Streptococcus*.
(3) *Clostridium*.
(4) *Monascus*.

**115.** **Assertion (A):** Dead plant remains such as leaves, bark, flowers and dead remains of animals, including fecal matter, constitute detritus.
**Reason (R):** Detritus is the raw material for decomposition.
(1) Both **Assertion (A)** and **Reason (R)** are true and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are true but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true and **Reason (R)** is false.
(4) **Assertion (A)** is false and **Reason (R)** is true.

**116.** Secondary carnivores feed on;
(1) plants.
(2) plant eating animals.
(3) animals that eat plant eating animals.
(4) both plants and plant eating animals.

**117.** Among the following, _____ appear to be more vulnerable to extinction.
(1) amphibians
(2) fishes
(3) reptiles
(4) birds

**118.** **Statement I:** The size of the vascular bundles are dependent on the size of the veins in dicot leaves.
**Statement II:** The veins vary in thickness in the parallel venation of the monocot leaves.
(1) Statement I and Statement II both are correct.
(2) Statement I is correct but Statement II is incorrect.
(3) Statement I is incorrect but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

**119.** **Assertion (A):** Schleiden and Schwann together formulated the cell theory.
**Reason (R):** Schleiden and Schwann's cell theory did not explain as to how new cells were formed.
(1) Both **Assertion (A)** and **Reason (R)** are true and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are true but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true and **Reason (R)** is false.
(4) **Assertion (A)** is false and **Reason (R)** is true.

**120.** Identify the **incorrect** statement.
(1) The beginning of diplotene is recognised by the dissolution of the synaptonemal complex.
(2) Recombined homologous chromosomes of the bivalents separate from each other except at the sites of crossovers during diplotene stage.
(3) Site of crossover forms a structure called chiasmata.
(4) In oocytes of some invertebrates, diplotene can last for months or years.

**121.** Photosystem I (PS I) and Photosystem II (PS II) are named in the sequence;
(1) of their discovery.
(2) in which they function during the light reaction.
(3) in which they absorb light.
(4) in which they function during the dark reaction.

**122.** During the conversion of _____ to _____ a molecule of GTP is synthesised.
(1) succinyl-CoA; succinic acid
(2) succinic acid; succinyl-CoA
(3) succinyl-CoA; malic acid
(4) malic acid; succinyl-CoA

**123.** All of the following are the extrinsic factors affecting growth and differentiation of plants, **except**;
(1) light. (2) genetic.
(3) nutrition. (4) water.

**124.** Match **List-I** with **List-II** to find out the **correct** option.

| **List-I (Part of gynoecium)** | | **List-II (Post-fertilisation structure)** | |
|---|---|---|---|
| (I) | PEN | (A) | Embryo |
| (II) | Zygote | (B) | Endosperm |
| (III) | Ovule | (C) | Fruit |
| (IV) | Ovary | (D) | Seed |

| | **I** | **II** | **III** | **IV** |
|---|---|---|---|---|
| (1) | B | A | D | C |
| (2) | A | C | B | D |
| (3) | A | B | D | C |
| (4) | B | A | C | D |

**125.** Identify the **incorrectly** matched pair.

| | | |
|---|---|---|
| (1) | Incomplete dominance | Inheritance of flower colour in snapdragon flower |
| (2) | Co-dominance | Inheritance of flower colour in dogflower |
| (3) | Complete dominance | Height of pea plant |
| (4) | Multiple allelism | ABO Blood group system |

**126.** Francis Crick proposed the Central dogma in molecular biology, which states that the genetic information flows from;
(1) DNA → RNA → Protein.
(2) RNA → DNA → Protein.
(3) DNA → Protein → RNA.
(4) Protein → DNA → RNA.

**127.** Use of biological control agent for agricultural pest control is an example of;
(1) mutualism.
(2) competition.
(3) predation.
(4) parasitism.

**128.** Read the following statements and identify them as **true (T)** or **false (F)**.
A. Nerve cells are some of the longest cells.
B. Among multicellular organisms, human red blood cells are about 0.7 μm in diameter.
C. Mycoplasma is the smallest cell.

| | **I** | **II** | **III** |
|---|---|---|---|
| (1) | T | F | T |
| (2) | F | T | F |
| (3) | T | T | F |
| (4) | F | F | T |

**129.** Identify the **mismatched** pair.
(1) PS I - Absorption maxima of 700 nm
(2) PS II - Linked with photolysis of water
(3) PS I - Present in stroma lamellae only
(4) PS II - Present in lamellae of the grana only

**130.** **Statement I:** In both lactic acid and alcohol fermentation, more than seven per cent of the energy in glucose is released.
**Statement II:** All of the energy released from glucose is trapped as high energy bonds of ATP in lactic acid and alcohol fermentation.
(1) Statement I and Statement II both are correct.
(2) Statement I is correct but Statement II is incorrect.
(3) Statement I is incorrect but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

**131.** Identify the characteristic that is seen in wind pollinated flowers.
(1) Light pollen grain
(2) Sticky pollen grain
(3) Stamen within cleistogamous flower
(4) Small feathery stigma

**132.** What is the percentage of wrinkled green pea seeds obtained in $F_2$ generation of Mendel's dihybrid cross experiment?
(1) 56.25%
(2) 43.75%
(3) 18.75%
(4) 6.25%

**133.** The _____ charged DNA is wrapped around the _____ charged histone octamer to form a structure called nucleosome.
(1) negatively; negatively
(2) positively; positively
(3) positively; negatively
(4) negatively; positively

**134.** Identify the pair of dominant wild type traits of *Drosophila melanogaster*.
(1) Yellow-body, white-eye
(2) Brown-body, red-eye
(3) Yellow-body, red-eye
(4) Brown-body, white-eye

**135.** Identify the **incorrect** statement w.r.t Frederick Griffith's transforming principle experiment.
(1) The S strain bacteria have a mucous (polysaccharide) coat.
(2) Mice infected with the S strain die from pneumonia infection.
(3) Mice infected with the R strain do not develop pneumonia.
(4) Mice infected with the heat killed S strain die from pneumonia infection.

## SECTION-B

**136.** Certain marine ____ algae produce large amounts of hydrocolloid called carrageen.
(1) brown (2) red
(3) green (4) blue-green

**137.** **Assertion (A):** In alternate type of phyllotaxy, a single leaf arises at each node in alternate manner.
**Reason (R):** *Calotropis* and guava plants show alternate phyllotaxy.
(1) Both **Assertion (A)** and **Reason (R)** are true and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are true but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true and **Reason (R)** is false.
(4) **Assertion (A)** is false and **Reason (R)** is true.

**138.** Hypodermis is the outer layer of cortex in monocot stem that consist of;
(1) living tissue.
(2) dead tissue.
(3) collenchymatous tissue.
(4) parenchymatous tissue.

**139.** Match **List-I** with **List-II** to find out the **correct** option.

| **List-I** | | **List-II** | |
|---|---|---|---|
| (I) | Golgi apparatus | (A) | Pigment bearing organelles in plants |
| (II) | Lysosomes | (B) | Rich in hydrolytic enzymes |
| (III) | Mitochondria | (C) | Concentrically arranged near the nucleus |
| (IV) | Plastids | (D) | Inner membrane forms a number of infoldings |

| | **I** | **II** | **III** | **IV** |
|---|---|---|---|---|
| (1) | A | B | D | C |
| (2) | C | D | B | A |
| (3) | C | B | D | A |
| (4) | A | C | B | D |

**140.** Cell plate formation takes place during;
(1) cytokinesis in plants.
(2) cytokinesis in animals.
(3) karyokinesis in plants.
(4) karyokinesis in animals.

**141.** Identify the **true** statement w.r.t chemiosmotic hypothesis during photosynthesis.
(1) Within the chloroplast, protons in the stroma increase in number, while in the lumen there is decrease in the number of protons.
(2) The pH of the lumen increases.
(3) The ATP synthase enzyme consists of two parts, $CF_0$ and $CF_1$.
(4) $CF_1$ is embedded in the thylakoid membrane and forms a transmembrane channel that carries out facilitated diffusion of protons across the membrane.

**142.** **Statement I:** Animals obtain food from plants indirectly (herbivores) or directly (carnivores).
**Statement II:** Saprophytes like fungi are dependent on dead and decaying matter.
(1) Statement I and Statement II both are correct.
(2) Statement I is correct, but Statement II is incorrect.
(3) Statement I is incorrect, but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

**143.** _____ promote(s) nutrient mobilisation which helps in the delay of leaf senescence.

(1) Auxins
(2) Gibberellins
(3) Cytokinins
(4) Ethylene

**144.** **Assertion (A):** Geitonogamy is functionally cross pollination.

**Reason (R):** Geitonogamy is the transfer of pollen grains from the anther to the stigma of another flower of the same plant.

(1) Both **Assertion (A)** and **Reason (R)** are true and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are true but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true and **Reason (R)** is false.
(4) **Assertion (A)** is false and **Reason (R)** is true.

**145.** Consider the following characters and identify the disease.

A. It is a Mendelian disorder.
B. It is an autosome-linked recessive disease.
C. The defect could be due to either mutation or deletion which ultimately results in reduced rate of synthesis of one of the globin chains (α and β chains) that make up haemoglobin.
D. The formation of abnormal haemoglobin molecules results into anaemia.

(1) Haemophilia
(2) Sickle-cell anaemia
(3) Phenylketonuria
(4) Thalassemia

**146.** Identify the **incorrect** statement.

(1) DNA ligase joins the fragments of new fragments of DNA formed on the template DNA with polarity 3' → 5'.
(2) DNA-dependent DNA polymerase uses DNA as template for replication.
(3) On the template DNA strand with polarity 3' → 5', the replication is continuous.
(4) Origin of replication is a specific region on DNA where replication originates.

**147.** **Statement I:** During growth in milk, the LAB produce acids that coagulate and partially digest the milk proteins.

**Statement II:** LAB improves nutritional quality of milk converted into curd by increasing vitamin $B_5$.

(1) Statement I and Statement II both are correct.
(2) Statement I is correct, but Statement II is incorrect.
(3) Statement I is incorrect, but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

**148.** The value of intrinsic rate of natural increase for flour beetle is;

(1) 0.015.
(2) 0.12.
(3) 0.0205.
(4) 0.65.

**149.** Match **List-I** with **List-II** to find out the **correct** option.

| **List-I** | | **List-II** | |
|---|---|---|---|
| (I) | Pyramid of biomass in sea | (A) | Usually upright |
| (II) | Pyramid of energy | (B) | Always upright |
| (III) | Pyramids, of number, of energy and biomass in most ecosystems | (C) | Generally inverted |

| | **I** | **II** | **III** |
|---|---|---|---|
| (1) | C | B | A |
| (2) | A | B | C |
| (3) | C | A | B |
| (4) | A | C | B |

**150.** Identify the example of species diversity of living organisms.

(1) *Rauwolfia vomitoria* growing in different Himalayan ranges.
(2) Varieties of mango in India.
(3) Greater amphibian species growing in Western Ghats compared to Eastern Ghats.
(4) Greater ecosystem diversity in deserts compared to Scandinavian country like Norway.

# (ZOOLOGY)

## SECTION-A

**151.** How many of the organisms given below in the box exhibit branchial respiration?

| Snail, Shark, Whale, Katla, Prawn, Dolphin |
|---|

(1) 6 (2) 3
(3) 4 (4) 5

**152.** Saheli is a non-steroidal preparation, was developed at;
(1) Indian Council of Agricultural Research, New Delhi.
(2) Central Drug Research Institute, Lucknow.
(3) Indian Council of Medical Research, Pune.
(4) All India Institute of Medical Sciences, New Delhi.

**153.** Flagellar movement assists in all of the following, **except;**
(1) Swimming of spermatozoa in female genital tract.
(2) Maintenance of water current in the canal system of sponges.
(3) Locomotion of protozoans like *Euglena.*
(4) Locomotion of *Paramoecium.*

**154.** In mammals, which of the following is synthesized in liver and excreted by kidneys?
(1) Ammonia (2) Urea
(3) Glycogen (4) Bile

**155.** All of the given are involved in coagulation of blood, **except;**
(1) Thrombokinase (2) Calcium ions
(3) Thrombocytes (4) Globulins

**156.** How many segments comprises the abdomen in both male and female cockroaches?
(1) 11 (2) 12
(3) 10 (4) 9

**157.** Who made a sea voyage in a sail ship called HMS Beagle round the world?
(1) Alfred Wallace
(2) Charles Darwin
(3) Thomas Malthus
(4) Hugo de Vries

**158.** Gland 'X' is located in between lungs behind sternum on the 'Y' side of aorta. Select the **correct** option for **'X'** and **'Y'** respectively.
(1) Thymus and dorsal
(2) Thymus and ventral
(3) Thyroid gland and ventral
(4) Thyroid gland and dorsal

**159.** Gene cloning means;
(1) creation of recombinant DNA.
(2) making multiple identical copies of any template DNA.
(3) maintenance of sterile ambience in chemical engineering processes.
(4) correcting a defective gene.

**160.** If a human male ejaculates about 100 million sperms during a coitus. For normal fertility, how many sperms must show vigorous motility?
(1) 60 million (2) 74 million
(3) 24 million (4) 40 million

**161.** **Assertion (A)**: A plant cell differs from an animal cell in possessing a cell wall outside the plasma membrane.
**Reason (R)**: A constituent of plant cell wall is homopolymer of glucose.
(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

**162.** The biological response modifiers used for cancer treatment include;
(1) Vinblastine
(2) α-interferons
(3) Chemotherapeutic drugs
(4) Use of X-rays

**163.** The squamous epithelium layer of alveolar wall is _____ layered thick in humans.
(1) Two (2) Three
(3) One (4) Four

**164.** Genetic engineering has been used to create tailor-made plants to supply alternative resources to industries in all the following form, **except**;
(1) Pharmaceuticals (2) Fuels
(3) Starches (4) Ceramics

**165.** The exoskeleton of arthropods is made up of a complex polysaccharide, which is a;
(1) heteropolymer.
(2) homopolymer.
(3) storage polysaccharide in plants.
(4) fructose derivative.

**166.** How many of the following animals given below in the box show bilateral symmetry in their adult stages?

| |
|---|
| *Bombyx, Ophiura, Pristis, Echinus, Rana, Sepia* |

(1) Six (2) Four
(3) Two (4) Five

**167.** Which of the following represents the bulb-like structure present at the distal end of axon?
(1) Synaptic vesicle
(2) Dendrite
(3) Nissl's granule
(4) Synaptic knob

**168.** Which of the following is a popular contraceptive brand **not** for use by females?
(1) Implants
(2) Saheli
(3) Nirodh
(4) Lippes loop

**169.** The number of wrist bones in a forelimb of an adult man is equal to the number of;
(1) cranial bones.
(2) thoracic vertebrae.
(3) sternum and palm bones.
(4) ear ossicles and false ribs

**170.** Select the **correct** feature for the formed element in blood which plays a significant role in transport of respiratory gases.
(1) Devoid of nucleus in mature form.
(2) Involved in inflammatory reactions.
(3) Contains yellow coloured pigment.
(4) Least abundant of all the cells in blood.

**171.** Select the **correct** option to complete the analogy.
Graafian follicle: Follicular phase :: Corpus luteum: _____
(1) Secretory phase
(2) Proliferative phase
(3) Menstrual phase
(4) Bleeding phase

**172.** Allergy is due to the release of chemicals like _____ and serotonin from _____ cells.
Choose the **correct** option that fill the blanks respectively.
(1) Anti-histamine and mast
(2) Histamine and mast
(3) Adrenaline and mast
(4) Cortisol and mast

**173.** Restriction endonuclease works by breaking the bond between;
(1) Adenine and thymine.
(2) Purine and phosphate group of deoxyribose nucleic acid.
(3) Deoxyribose-phosphate backbone of DNA at specific points on each strand.
(4) Deoxyribose and thymine.

**174.** Read the following features w.r.t. their presence in *Petromyzon* and select the **incorrect** one.
(1) Spawning in fresh water
(2) Cartilaginous vertebral column
(3) Open circulatory system
(4) Sucking type of mouth parts

**175.** If gene migration happens multiple times then it is named as;
(1) gene pool.
(2) genetic recombination.
(3) genetic drift.
(4) gene flow.

**176.** The side effects of use of anabolic steroids in females include all of the following, **except;**
(1) Increased aggressiveness
(2) Enlargement of clitoris
(3) Premature baldness
(4) Abnormal menstrual cycles

**177.** Read the following statements and choose the **correct** option w.r.t frog.
A. The cloaca is a small, median chamber that is used to pass faecal matter, urine and sperms to the exterior.
B. Male reproductive organs consist of a pair of yellowish ovoid testes.
C. External ear is absent and only tympanum can be seen externally.
(1) Only A (2) Only A and B
(3) Only B and C (4) A, B and C

**178.** **Assertion (A)**: All vertebrates respires through lungs.
**Reason (R)**: Lungs are vascularised bag like structure.
(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

**179.** Which of the given options gives one **correct** example each of convergent evolution and divergent evolution?

| | **Convergent evolution** | **Divergent evolution** |
|---|---|---|
| (1) | Vertebrate Hearts | Wings of butterfly and of birds |
| (2) | Forelimbs of whale and bat | Vertebrate brains |
| (3) | Flippers of penguins and dolphins | Thorns of *Bougainvillea* and tendrils of *Cucurbita* |
| (4) | Darwin's finches | Sweet potato and potato |

**180.** **Assertion (A)**: Blood is a specialized connective tissue.
**Reason (R)**: Nearly 55% of blood comprises formed elements.
(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A)**.
(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.
(3) **Assertion (A)** is true, and **Reason (R)** is false.
(4) **Assertion (A)** is false, and **Reason (R)** is true.

**181.** Which among the following primarily ensures that only one sperm fertilises the ovum?
(1) Vitelline membrane
(2) Zona pellucida
(3) Acrosome
(4) Perivitelline space

**182.** Single axon is found in which type of neuron?
(1) Multipolar neuron
(2) Unipolar neuron
(3) Bipolar neuron
(4) All of these

**183**. If 40 sperms are formed, then how many secondary spermatocytes have completed the meiosis?
(1) 10 (2) 20
(3) 30 (4) 40

**184.** Arrange the following events in **correct** order of their evolutionary origin.
A. Jawless fish evolved.
B. Sea weeds evolved.
C. Origin of invertebrates.
D. Appearance of *Ichthyosaurs*.
(1) A → C → D → B
(2) D → A →B → C
(3) A → C → B → D
(4) C → A → B → D

**185.** Which hormone directly affect transcription by acting on gene?
(1) FSH (2) GH
(3) Estrogen (4) CCK

## SECTION-B

**186.** Choose the **mismatched** pair w.r.t. disease and its symptoms.
(1) AIDS - Bouts of fever, diarrhoea and weight loss
(2) Ringworms - Appearance of dry, scaly lesions
(3) Filariasis - Internal bleeding, anemia
(4) Amoebiasis - Abdominal pain and cramps

**187.** **Statement I:** The excretory system consists of a pair of kidneys, ureters, cloaca and urinary bladder in frog.
**Statement II:** Each kidney in frog is composed of several structural and functional units called uriniferous tubules or nephrons.
(1) Statement I and Statement II both are correct.
(2) Statement I is correct, but Statement II is incorrect.
(3) Statement I is incorrect, but Statement II is correct.
(4) Statement I and Statement II both are incorrect.

**188.** Select the **odd one** w.r.t the accepted grounds for MTP.
(1) Continuation of pregnancy would involve a risk to the life of the pregnant woman.
(2) Continuation of pregnancy would involve a risk of grave physical injury.
(3) There is substantial risk that if the child were born it would suffer from physical or mental abnormality.
(4) Continuation of pregnancy would involve high expenses on medical facilities.

**189.** Select the **incorrect** match.
(1) *Rana* – Moist skin and eyes have eye lids
(2) Devil Fish – Muscular foot and radula for rasping
(3) Star fish – Water vascular system and external fertilisation
(4) *Balanoglossus* – Collar cells and a long trunk with diploblastic body

**190.** Match **List-I** with **List-II** and choose the **correct** option.

| **List-I** | | **List-II** | |
|---|---|---|---|
| (A) | *Homo erectus* | (I) | Buried their dead |
| (B) | Neanderthal man | (II) | Large brain around 900 cc |
| (C) | *Australopithecines* | (III) | Arose during ice age |
| (D) | *Homo sapiens* | (IV) | Hunted with stone weapons |

| | **A** | **B** | **C** | **D** |
|---|---|---|---|---|
| (1) | II | I | IV | III |
| (2) | II | I | III | IV |
| (3) | IV | III | II | I |
| (4) | I | IV | III | II |

**191.** **Assertion (A):** Closed circulatory system is more advantageous as compared to open circulatory system.

**Reason (R):** In closed circulatory system, flow of fluid can be more precisely regulated.

(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A)**.

(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.

(3) **Assertion (A)** is true, and **Reason (R)** is false.

(4) **Assertion (A)** is false, and **Reason (R)** is true.

**192.** Choose the **correct** statement w.r.t. proteins.

(1) Trypsin is a nucleic acid which acts as an enzyme.

(2) Insulin is a polysaccharide hormone.

(3) GLUT-4 is a transporter which enables glucose transport into cells.

(4) Collagen is intracellular ground substance.

**193.** Given below are three statements (**A-C**) regarding human circulatory system.

A. Blood consists of a fluid matrix, plasma and formed elements.

B. A special case of Rh incompatibility has been observed between the $Rh^{-ve}$ blood of pregnant mother with $Rh^{+ve}$ blood of the foetus.

C. Each peak in the ECG is identified with a letter from P to T that corresponds to a specific electrical activity of the heart.

Select the option which includes only **correct** statement(s).

(1) A and B only

(2) A, B and C

(3) A only

(4) B and C only

**194.** **Statement I**: Coelenterates exchange $O_2$ with $CO_2$ by simple diffusion over their entire body surface.

**Statement II**: Molluscs perform branchial respiration.

(1) Both statement I and statement II are correct.

(2) Both statement I and statement II are incorrect.

(3) Statement I is correct but statement II is incorrect.

(4) Statement I is incorrect but statement II is correct.

**195.** **Assertion (A)**: NaCl is transported by the ascending limb of Henle's loop which is exchanged with the descending limb of vasa recta.

**Reason (R)**:NaCl is returned to the interstitium by the ascending portion of vasa recta.

(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A)**.

(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.

(3) **Assertion (A)** is true, and **Reason (R)** is false.

(4) **Assertion (A)** is false, and **Reason (R)** is true.

**196.** **Assertion (A):** Myasthenia gravis is an auto immune disorder.

**Reason (R):** It will affect neuromuscular junction leading to fatigue, weakening and paralysis of skeletal muscle.

(1) Both **Assertion (A)** and **Reason (R)** are true, and **Reason (R)** is a correct explanation of **Assertion (A)**.

(2) Both **Assertion (A)** and **Reason (R)** are true, but **Reason (R)** is not a correct explanation of **Assertion (A)**.

(3) **Assertion (A)** is true, and **Reason (R)** is false.

(4) **Assertion (A)** is false, and **Reason (R)** is true.

**197.** Match **List-I** with **List-II** and choose the **correct** option.

| **List-I** | | **List-II** | |
|---|---|---|---|
| (A) | Arachnoid | (I) | Outer layer |
| (B) | Dura mater | (II) | Inner layer |
| (C) | Pia mater | (III) | Middle layer |

| | **A** | **B** | **C** |
|---|---|---|---|
| (1) | III | II | I |
| (2) | II | III | I |
| (3) | III | I | II |
| (4) | I | III | II |

**198.** Select the **correct** matching.

(1) Insulin - Decreases the uptake of glucose utilisation by hepatocyte and adipocytes

(2) Cortisol - Decreases RBC production, causes inflammation

(3) Thymosin - Promotes the production of antibodies to provide humoral immunity

(4) Thyroxine - No role in water and electrolyte balance.

**199.** **Statement I**: Biotechnology deals with small scale production and marketing of products and processes using living organisms, cells only.

**Statement II**: Biotechnology using genetically modified organisms was made possible only when man learnt to alter the chemistry of DNA and construct recombinant DNA.

(1) Both statement I and statement II are correct.
(2) Both statement I and statement II are incorrect.
(3) Statement I is correct but statement II is incorrect.
(4) Statement I is incorrect but statement II is correct.

**200.** For effective treatment of a disease;

(1) early diagnosis is needed but undertaking of its pathophysiology is not required.
(2) early diagnosis is not needed but understanding of its pathophysiology is required.
(3) early diagnosis and understanding of its pathophysiology are required.
(4) neither early diagnosis nor understanding of its pathophysiology is required.

■■■

## *SPACE FOR ROUGH WORK*

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